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THE PLACE FOR THE STUDY OF LANGUAGE IN A CURRICULUM OF EDUCATION.

M. PUTNAM JACOBI, M. D.

The study of language has always occupied a conspicuous place in educational curricula. The Greeks, who counted all languages but their own barbarian, taught the grammar of their own as the basis of all education. The Roman children studied Greek as ours do French—less as an education than as a fashion. The first mediaeval schools established grammar in the trivium, or most elementary course, and also in the quadrivium. The feeling has always prevailed in civilized communities, that as the mind was never seen to work without language, the study of language must lie at the basis of all mental training. We know now that much mental action precedes the use of words, and whenever we are logical to the laws of mental development, we train the mind to handle sense perceptions of external objects before we introduce the systematic study of language, even in reading and writing the mother tongue. Every one knows, however, that this change in the school curriculum is most recent.

The moment arrives at last when the study of language must begin, even if nothing is learned but the native language of the child. This moment may to a certain extent be compared with that illustrious epoch in European history, when at the Renaissance of learn-

ing, classical Latin and Greek were rediscovered for the modern world. The extraordinary effect of this discovery may well serve to prove the importance of language to thought. With an imperfect and inadequate language, the nations of Northern Europe had remained in a narrow, cramped, and as we now often say, with perhaps considerable exaggeration, a barbarous existence. Restored to the noble speech of which they were the just inheritors, their compressed life rapidly expanded to its measure. The new vitalities aroused, soon in turn expanded the hidden potentialities of the antique tongues to all the flexible and varied needs of the modern life, and this life rapidly developed to a hitherto unknown degree of complexity. An immense number of thoughts seemed to have been impossible from the lack of fitting words. When these words were found—the buried treasure of by-gone ancestors—the thoughts sprang to them as rider to the saddle ; and with new ideas, life was regenerated.

Thus, although the material for the physical sciences existed in the same abundance then as now, these sciences failed to develop until after the Renaissance of classical learning. It seemed necessary that Scaliger and Erasmus, in the sixteenth century, should precede Gilbert and Harvey in the seventeenth, to render possible their discoveries of electricity and of the circulation of the blood. The solitary labors of Roger Bacon in the thirteenth century had flickered like a taper in a vast cavern of darkness, and then failed for lack of air. The human brain could not advance in analysis of the external world until it had been disciplined and developed in its internal activity by training in language.

But, at the present day, the educational value of the

study of languages has begun to be seriously questioned. In a late number of the *Forum* Dr. Flint declares that as much mental discipline can be obtained from study of physics and chemistry as from study of languages, and that the knowledge thus gained is both more useful and more easily understood than the construction of Latin and Greek. He also observes that the range of subjects on which knowledge is desirable has greatly widened since the classical curricula were planned, and that it is impossible to do justice to all that is necessary to-day if we continue to fulfil all the demands which were made two hundred years ago. Similar remarks are repeated over and over again, and on all sides. These assertions touch, indeed, upon some truth, but they do not comprehend all of it, and they overlook much that is essential to the questions at issue. The problems to be considered are :

1. Does the study of language exercise any different effect upon mental development from the study of any other subject, and if so, what is it ?
2. How does the effect of language study compare with that of mathematics, of the physical sciences, of the moral and historical sciences ?
3. If such special effect can be proved, at what age or epoch of education is it most appropriate and useful to seek for it ?
4. Is there any difference between the effect on the brain of the classic and the modern languages ?
5. If languages are to be taught, how is the necessary time to be secured for teaching other things most important to know and too often neglected ?
6. What proportion should these relative branches of study bear to each other in a general, non-specialized curriculum ?

7. What special devices or methods may be suggested to facilitate the accomplishment of the above mentioned ends?

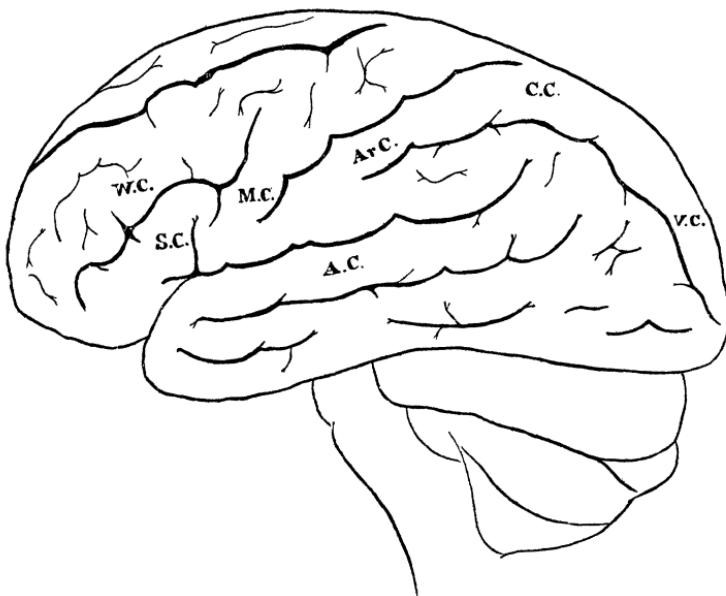
At the outset I would call attention to a fact which might seem self-evident, yet is generally overlooked in pedagogical discussions of the subject. This is, that the study of languages must be an extension, more or less complex, of the process of acquiring language—the highest physiological acquisition that distinguishes the human race from the lower animals. The method and educational results of such study are, therefore, primarily a physiological problem, and should be discussed by physiologists before they are handed over to pedagogues.

The genesis of speech is one of the most extraordinary and mysterious phenomena in the history of mankind. It has always justly excited the astonishment and speculations of philosophers.

It is most difficult to understand why any particular sound, or group of sounds, should have become significant of one object or idea rather than of any other. A purely physiological theory has tried to classify all words according to the parts of the articulating apparatus at which their fundamental sounds are formed, thus giving one intrinsic meaning to guttural sounds, another to labials, another to dentals, etc. But this theory cannot meet all the facts of the case. Prof. Max Mueller, who traces all words in the Indo-European languages back to 850 primary Sanscrit roots, is inclined to accept another physiological explanation of the genesis of the roots. This is the theory of Noiré. The latter has pointed out that whenever a number of people are engaged together in any muscular work, they have a tendency to utter aloud certain rhythmical

sounds. "These are almost involuntary vibrations of the voice, corresponding to the more or less regular movements of the whole bodily frame." Noiré suggests that some special nerve element, or group of nerve elements, in the brain is then thrown into vibration coincidently with the external muscular movement; and this associated nerve vibration being propagated to the part of the brain which innervates the organs of articulation, the latter are excited to so modulate the simultaneously developed current of air in expiration, that a definite sound, one of the primitive root sounds, is produced. This verbal root remains associated with the act which was being performed during its articulation, and finally becomes an expressive sign for the entire class of acts during which it is habitually repeated. "Thus would be explained," observes Mueller, "the fact that the primitive Sanscrit roots all express actions and not objects: as actions of digging, cutting, rubbing, etc." Words expressive of other ideas are derived from the first by analogy and metaphor. This theory should also explain why any given root should bear a special relation to any given action, and hence come to express any special group of ideas. It does so, because it has been generated in a cerebral excitation, that has happened to coincide with such other cerebral excitations as have been necessary to the performance of voluntary muscular actions.

Thus, in the figure, *Ar. C.* is placed on a part of the brain that we know is always excited when a person is using his right arm; *S. C.*, on a point very near it, which is always excited when he is speaking. Nerve impulses pass from this point down through the brain until they reach the nerves coming from the base of it, and



W. C. writing centre, *S. C.* speech centre, *M. C.* motor centre for lips, *Ar. C.* arm centre, *C. C.* concept centre (location hypothetical), *A. C.* auditory centre, *V. C.* visual centre.

which go to the throat, tongue, palate and lips. According to the theory, the excitation or vibration of nerve elements at the point *Ar. C.* spreads to point *S. C.*, the so-called centre of articulation, where it throws nerve cells into some special form of vibration. This special form of vibration is transmitted out of the brain, along nerves going to the lips and other organs of articulation, and the current of air which is at the moment issuing from them is moulded into some special articulate sound. This becomes a root, an auditory sign, which first evolved (according to the hypothesis) during the performance of a given act, is repeated with every repetition of the act, and gradually becomes an abstract sign corresponding to the gen-

eralized conception of such a class of acts. Thus the first abstraction of speech would result from a generalized experience of a succession of personal actions. In the second stage of development, the sign would be extended by analogy to other actions than the original one; finally to the properties of objects that seemed explicable by reference to these actions, which were better known than the objects themselves.

Thus, observes Mueller, every root expresses a concept or general notion, or more correctly, the remembered consciousness of repeated acts, as scraping, digging, striking, joining, etc.¹ As a single illustration. From a root *khan*, to dig, easily came *khana*, meaning not only a digger, but also a hole; and *khani*, a digger and a mine.

I will not dwell on the various interesting facts which might be adduced in support of this theory. But, in considering it, we are led to note the fundamental circumstance that speech implies a more extensive excitation of the brain than does any action performed without speech, including in the latter the systematized thinking which clothes itself in words. In its most rudimentary form, the articulate utterance accompanying a muscular movement implies that nervous action has spread from the nerve centres governing the movements of limbs, to those adjacent centres which control the organs of articulation. Closely adjacent to these centres are other portions of the brain which have no immediate connection with nerves either going to or coming from the brain. The Island of Reil is one of them. These portions of the brain are concomitantly drawn into the vortex of excitement, and when that is the case, the vibrations

¹ The Science of Thought, p. 214.

of nerve cells and fibres which occur during the utterance of the speech, are repeated or registered, as it is said, in these extra-sensory centres. It is then, in some mysterious way, that the consciousness or conception of speech is generated in the brain and mind of the speaking individual. The genesis does not occur unless the supra-sensual, superadded convolutions of the brain have attained a high degree of development, and this is why no animal but man is able to speak.¹

When any one learns the terms of a fully developed speech, or a baby learns his own language, the process is different. Here is no question of generating a spoken sign, compelled to assume an indissoluble relation to some thing. But it is only necessary to learn the spoken sign already created, and the fact that it *is* associated with a thing.

The sound of the word, as bread, falls upon the air and causes a peculiar vibration of the nerve running from the ear to the brain—the auditory nerve. This vibration is transmitted to a special locality of the brain, apparently the first temporo-sphenoidal convolution. Now, if the child has never seen any bread, the sound, though registered, arouses no mental conception ; it seems to have no meaning. It is the same when an adult hears a word in a language to him unknown, or when the subjects of certain forms of brain disease hear words after they have lost the power of attaching any significance to them. But if the baby—to return to him—has seen a piece of bread ; if he has become sufficiently interested in it to notice the association of this verbal sign with it ; if the asso-

¹See the most interesting paper of Broadbent on "Cerebral Mechanism of Speech and Thought," Med. Chir. Trans. 1872.

ciation has been distinctly pointed out to him, by pronouncing the name at the same time that the bread is shown or given, then another process takes place in his brain. At the same time that the name is registered in this part of the brain, the receptacle for auditory impressions, a visual impression of the object is registered at another point—the cuneus, or posterior portion of the occipital lobes. Often, indeed, the visual impression has been made long before ; the child has recognized the appearance of the piece of bread, when it could not as yet name it, but only reach after it with a gesture.

When the two impressions have been registered in the brain—the visual impression of the object, and the auditory impression of its name—they may then be combined. Exactly how this combination is effected we do not know ; but we can represent to ourselves that vibrations, similar to those of the auditory nerve, are transmitted along the fibres which connect these two points of the brain. When this happens, a secondary vibration is coincidently transmitted in another direction to the convolutions “superadded” to the simplest ones which belong to the sense impressions. In these convolutions the more complex combined vibration becomes the material correlative of an ideal concept, composed of the reminiscence of the visual impression of the object and of the auditory impression of its name.¹ Taine remarks that a couple is then formed, either member of which is thenceforth

¹ L'Intelligence, p. 6. The precise statement is as follows: “In the formation of *couples*, such that the first term of each suggests the second term ; and in the aptitude of this first term to stand wholly or partially *in place* of the second, so as to acquire either a definite set of its properties or all those properties combined, we have, I think, the first germ of the higher operations which make up man's intelligence.”

able to draw the other into consciousness. The sound of the name suggests the image of the object; the sight of the object suggests the sound of the name.¹

The association of written signs with visual images and with auditory signs is obviously only an extension of the same process, and need not be dwelt on here.

The child learns to recognize a word before he learns to use this word himself; but finally this step also is taken. He articulates the word "bread" under the influence of an internal impulse or desire composed of the sensation of hunger, of the reminiscence of the visual impression of the object, of other impressions or memories connected with it, as of its hunger-satisfying property; finally, of the auditory impression of its name. This complex internal impulse, when definitely formulated, corresponds to an excitation of some part of this intermediate portion of the brain that we may call for convenience, as it has been called, the concept centres. From these centres the excitation spreads to that point, whence are innervated the organs of articulation; and when they are excited in the proper way the child is uttering the word "bread." By that time an entire cycle of cerebral activity has been traversed, and the greater part of the area of the brain has been excited. *It is plain, therefore, that to learn the name of a thing, and to learn how to use this name, involves much more mental action than is required simply to acquire sense perceptions about it.*

¹ In an interesting paper on Apraxia and Aphasia, by Dr. Allen Starr (N. Y. Med. Record, Oct. 27, 1888), the hypothesis of a "suprasensual combining centre" is pronounced superfluous. The combination of the visual and auditory impression is said to be *virtually* effected when these simultaneously exist in the brain, and hence in the unity of consciousness of the individual.

The name, moreover, constitutes an important rise above the level of sense perceptions, and marks the initiation of a process that is to lead to all abstract thought.

The second step in this process is taken when the name of a single object is generalized to others so as to form a class.

Taine tells a pretty story of his little girl to illustrate these early efforts at classification. She had learned to call a lamp "brûle," and was also in the habit of playing hide and seek with her nurse, with the exclamation "cou-cou" uttered as the nurse's head disappeared behind her apron. The first time the child saw the setting sun she exclaimed, "a brûle cou-cou!" The new object was brilliant like the lamp, and disappeared like the nurse's head. The child imitated the logic of her Aryan ancestors, in combining this new double experience into a single expression containing the two characters of each of the others.

Thus the second step in language is a process of generalization by means of observed analogies. Between individual objects a complex mental concept is formed, existing nowhere in nature, but only in the mind of a human being holding it. In the act of extending an individual name to a class, the little child passes out of the animal world into the human world ; he becomes a rational being. For this reason some thinkers, as Professor Harris, have held that the possession is not only the sign of the soul, but the demonstration of its immortality. Whether this be so or not, the possession is none the less marvelous.

When verbal signs have once become associated with objects, it is possible for the mind to occupy itself

exclusively with them, and altogether to disregard the objects. It is as with signs of number, with whose aid, most complicated operations can be performed by the mathematician, which would be quite impossible if he were obliged to handle the concrete material objects to which these signs originally referred.

By means of signs, verbal or algebraic, the mind emancipates itself from things ; by analogy and metaphor and combination, it contrives to clothe the suggestion of a single root, with endless successions of meanings, among which the original significance may be entirely forgotten.

Thus the fundamental fact in the acquisition of language is, that it arouses the activity of the highest centres of the brain—the ideal or concept centres without whose functions all knowledge of the external world must remain as isolated groups of sense impressions. Language is essential to all but the simplest forms of thought, because the registration in the brain of a combined impression or personal experience, derived from the union of two or more sense impressions, is always attended by such a diffusion of excitation to the speech centre, that the organs of articulation are called into play, and words are pronounced. This at least is the case while speech is being generated or acquired for the first time. Subsequently, the utterance of speech aloud may be restrained ; but none the less is the speech centre thrown into activity, and the word re-echoes in the brain to the footfall of the thought.

The acquisition of foreign languages modifies the cerebral processes just described, by rendering them even more subtle and complicated.

The nervous tissue of which the brain is composed,

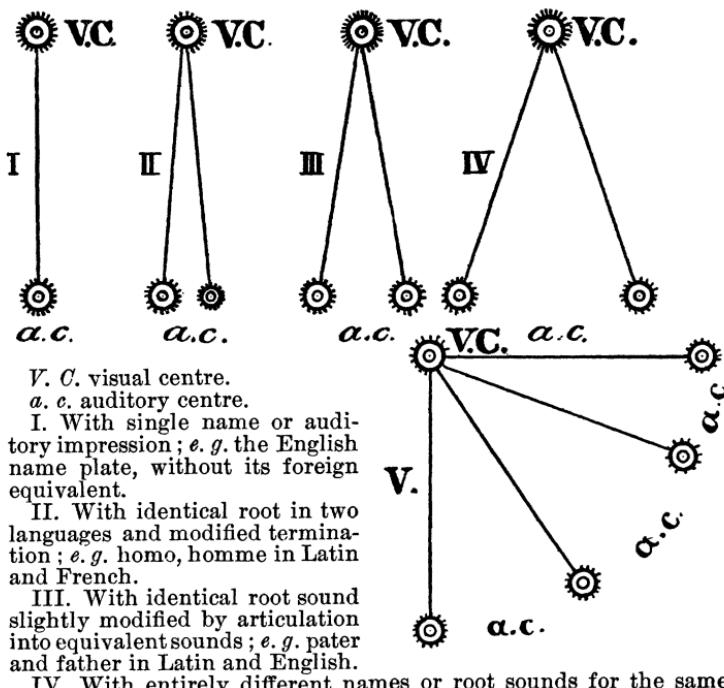
and to whose structure I have summarily alluded, is composed of an immense quantity of microscopic cells, traversed by delicate fibres, connected with each other by fine fibre-like prolongations of their own substance. By means of somewhat coarser fibres, separate territories of cells, and cells and groups of cells and fibres in the brain, become grouped together. It is because of the possibility of infinite variety in these groupings that the possibilities of speech are practically infinite.

The registration of a spoken word involves, we may say, schematically or provisionally, the excitation of as many nerve cells in the auditory centre as the word is composed of separable sounds. Thus, the word "father" implies two distinct excitations, one for the sound "fa," and the other for the sound "ther." Let us suppose now that another auditory impression be made, for the same object, by its Latin name, pa-ter. This name does not only correspond to the same object; it is philologically identical with the English word, the Latin being merely a modified articulation of the same root and termination. If therefore, having pronounced the syllable fa, we then pronounce the syllable pa, we must infer that the brain of the person perceiving the difference, registers the second syllable in a different, but closely adjacent locality to that registering the first; we may suppose, in the very next nerve cell.

If an object be successively described by two names whose sounds are not identical and which are derived from different roots, then we must suppose that not only different nerve cells, but different, and perhaps rather widely separated groups of nerve cells receive the auditory impression. Thus the English and German names, man and Mann, identical with each other, are entirely different from the Latin and French

homo and homme, which are identical. The nerve territories impressed are not therefore adjacent, and when the double sets of verbal signs for the four languages become associated in consciousness with the same object, we must suppose that the impulses converging upon the visual centre, to combine with the visual impressions of the object, are gathered from a larger area than when only a single auditory sign has been used.

The area is still wider if there are four entirely different words in the four languages known. The different conditions in the four cases may be represented thus: (it must be remembered that whenever two distant regions are affected, the fibres connecting the two must also be modified.)



Adopting the convenient schematic representation of the cerebral process involved, as a vibration and combination of vibrations, we may compare the successive complications to the vibrations of piano strings combined as follows :

- I. Tone A combined with tone B.
- II. Tone A combined with tone B and semitone C.
- III. Tone A combined with tone B and tone C.
- IV. Tone A combined with tone B and tone G.
- V. Tone A combined with tones E, F, G, in another octave.

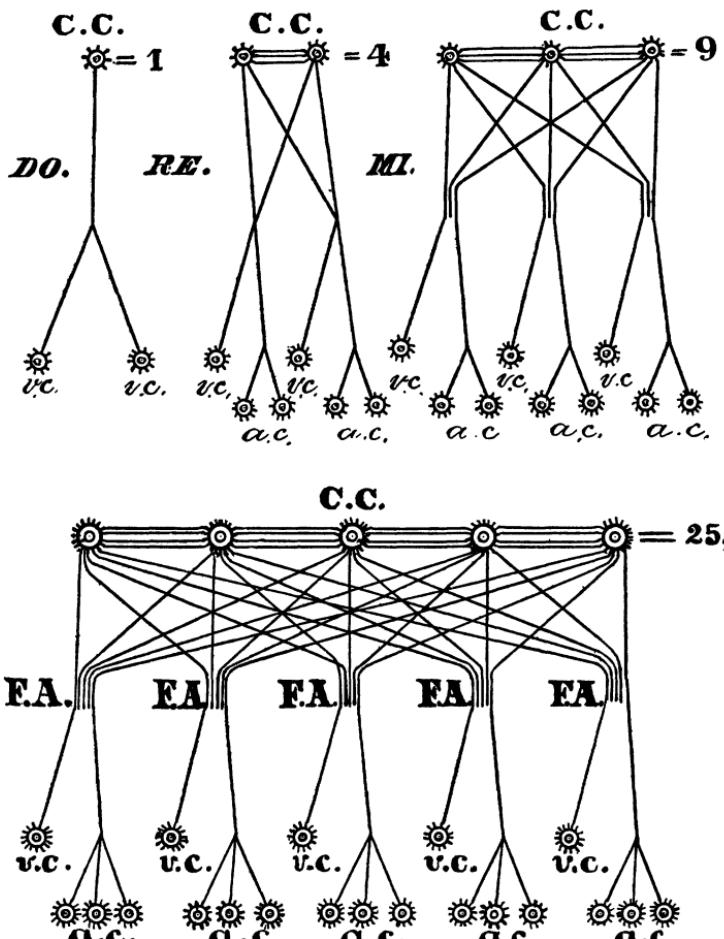
The various combinations and extensions of the area of cerebral excitation are effected even while the process remains limited to the instinctive acquisitions of multiple verbal signs, *i. e.* of two or more languages, by such unconscious effort as a child expends in learning his own or a foreign tongue in the nursery. But in the deliberate study of several languages, the complex combinations effected between the visual and auditory centres are carried up into the ideational or concept centre, there also to widen the area of excitation and increase its complexity.

To illustrate : let us call the first combination above described, *AB* ; the second, *ABC* ; the third, *ABC* ; the fourth, *ABCDEFG* ; the fifth, *AB+*, representing extension to another octave, with affection of all the intermediate notes.

These combinations may then be indicated by single symbols, which, to continue the analogy with musical vibrations, we will take from the musical scale : *AB* = Do ; *ABC* = Re ; *ABC* = Me ; *ABCDEFG* = Fa ; *AB+* = Sol.

The more complex the vibration transmitted to the concept centres, or to those parts of the brain where

visual and auditory impressions and their combinations rise into consciousness, the more complex the excitation which will be produced at these latter centres. This is equivalent to saying that there will be a more complex and varied generation of ideal impressions or ideas, by whatever mysterious process that may be brought about.



Thus, in this diagram, let *C. C.* represent the concept centre, thrown into vibration by impressions produced during the various combinations of the excitations of the visual and auditory centres, *V. C.* and *a. c.*

The diagram is intended to illustrate in a rude and approximate way, how the more complex vibration, as represented by the symbols, affects a larger area of all the groups in the concept centres, and also how the intensity of nerve vibrations at these points must rapidly increase. The increasing intensity is represented by the figures 1, 4, 9, 25. The series could of course be indefinitely extended, yet must always fall infinitely short of the complexity of the actual process.

To sum up : the acquisition of foreign languages in addition to the native tongue multiplies the number of verbal signs which the mind habitually couples with visual impressions. In registering and in using these multiple signs, the mind is compelled to more complex operations than when only one sign is used. When in different languages different primary words or roots are used to represent the same object, then the mind, using them all, becomes acquainted with the several aspects of that object which have impressed the minds of those among whom these different names have sprung up. Thus a larger impression of the object is formed, and the mind of the speaker, which is rendered more flexible and active by engaging in more complex internal processes, is also enlarged by a richer store of external impressions. This latter effect is proportioned to the degree to which the different language aspects of the object are thoroughly studied ; it may be entirely missed if they are not deliberately studied at all, but words learned only by rote or by habit.

It is finally to be noticed that while the mental or cerebral process increases in extent when multiple names are learned which have no relation to each other, *i. e.* which come from entirely different roots, the delicacy and finish of these processes is more increased by the study of closely related words, *i. e.* those with precisely the same root and only modified termination, or those whose identical roots are modified by the introduction of equivalent sounds, as p for v, g for k, etc.

The reason for this is the same as for any nervous action, and is conspicuous in nervo-muscular actions. Every one knows the immense superiority in delicacy and subtlety of the movements performed by the fingers as they pass through minute areas of space, as compared with the movements of the arms or legs, which may extend so much further. And in a similar fact lies the reason for the immense mental discipline to be derived from the study of the European languages, which are all so closely related as to be scarcely more than cognate dialects of Greek, Latin, and Gothic. The discipline is only obtainable when these languages are studied together as simple varieties of the European language. To study them separately and successively is as illogical and time-wasting as it would be to concentrate isolated attention upon peach blossoms or plums, instead of considering at once the great rose family, of which they are members. Neither in the botanical nor in the philological family can the characters of genera and species be understood without incessant reference to the more general characters of the class to which they belong. This reference is even more important for languages than for plants, on account of the incessant transformation of the one into the other, and of the historical phenomena of

development and decay which they share in common with living organisms. In the attempt to acquire an empirical acquaintance with apparently unrelated facts, enormous amounts of time are wasted, which would be saved by the scientific insight into the real relations of these facts, with which the study might just as well have been begun.

The first question we have proposed for solution may now be answered thus. There *is* a special effect produced by the acquisition of language, so special that it serves to distinguish man from the brutes. It depends upon and incessantly develops the ability to use abstract signs as symbols of things, and to use them apart from these things. It is essential to the elevation of the mind above the level of sense perceptions ; and itself develops the mental sphere in which ideal conceptions arise, combine with one another, and generate endless successions of new ideas.

The process of acquiring foreign languages, in addition to the mother tongue, modifies the original process, by extending, refining, and complicating it. Impressions are immensely multiplied and the mind becomes accustomed to take cognizance of such subtle differentiations that its delicacy of perception is indefinitely increased. The capacity to appreciate subtle distinctions, more subtle than those existing in nature outside of the mind, is essential to scientific work. It is also essential to a high grade of ethical culture. Not unjustly have language studies been entitled “Humanities”; for it is the grade of mental development which they foster, that is necessary for the harmonious and finely equitable maintenance of social relations. Without this culture, the study of the external world, even if successfully pursued—which is rarely the case—is

liable to have a materializing and even brutalizing effect, and that in proportion to the complexity of the interests involved. It is very possible for an illiterate carpenter to be a very honest fellow ; but it is much more difficult for an illiterate physician to be truly honorable, even when skillful in his craft.

II.

Language is not the only abstraction to which a young child becomes accustomed. The abstraction of number comes to him very early, and the study of arithmetic should even precede the systematic study of language.

Our second question demanded a comparison of these two forms of abstraction, Language and Arithmetic. The comparison is not difficult to make. Number is a single quality abstracted from objects, to be handled separately by means of its signs. But words represent multiple qualities combined in constantly varying proportions.

When the child first learns the principles of number, it must not abstract this quality from concrete objects ; but these are to be handled until a number of concrete visual impressions have been firmly engraved upon the mind.

With words, however, the association with visual impressions, which is so much more complex, must also be maintained for a much longer time. For two or three years, no word should be given to the child or handled by him which cannot be directly referred to sense perceptions ; and it is indefinitely desirable to revive their association and to make it as vivid as possible.

Thus, mathematical signs, earlier detached from

objects, soon pass into a more purely abstract region than words, from which the image of the object is never completely effaced, and which indeed constitute forever a marvelous transition ground between purely mental conceptions and purely sense impressions. The high degree of abstraction of mathematical signs, however, is balanced by the much greater simplicity of their mutual relations ; while the more concrete and sensuous character of verbal signs is associated with an incalculable multiplicity and qualitative variety of interrelation. Hence they bring the mind much nearer to the infinite variety of nature than does mathematics. The abstractions of language prepare for the copious details of natural science and of practical life ; the abstractions of mathematics, though essential to the scientific manipulation of these details, are liable, if uncorrected, to unfit the mind for their assimilation. Mathematical training facilitates the working of the syllogism ; but language training tends much better to facilitate the discovery of the premises.

Let us now compare the study of language with the study of physical science.

Physical science consists of two parts : 1st, the acquisition of sense impressions through contact with external phenomena. 2d. The collation, comparison, and classification of these impressions, reasoning upon them, and establishment of the laws of phenomena.

The first process collects the raw material of science. But it is the second process that creates science out of its raw material. Science is not nature, but the product of the mind acting upon nature.

Thus the first process in scientific study corresponds to the activity of sense impressions, which for every

individual constitutes the earliest form of conscious activity. The second process corresponds to the second step, taken when the mind reacts upon its sense impressions sufficiently to generate words, to create language. Words are the first products of the action of mind upon nature, as science is the latest and most complex expression of the same action. Thus language is the earliest and most perfect type of science. In its three-fold nature it offers a three-fold type, namely, in words, in grammar, and in literature.

Words, as has been shown, result from the combined activity of several sensory centres in the brain, taken together, or further combined with that of its ideal centres, the latter being, probably, portions of the brain which are not immediately connected with sensi-motor apparatus or with sense impressions. Words may, therefore, be compared to the centaurs of antiquity which were half man and half beast. For on one side they contain the image of external objects ; on the other, they consist of a mental sign which has been generated within the brain. Hence, words may be studied in a twofold manner, objectively by methods appropriate to any study of objects, while subjectively they may be utilized to exercise the mind in handling abstractions not yet disconnected from concrete things.

Now, it is quite impossible permanently to choose, as some people seem to imagine, between study of words and study of things, after the very first steps have been taken. The first steps must certainly consist in direct observation of things, and in training the senses by such observation. This doctrine is very recently enunciated, but now commands general acceptance. We know now that the use of language does not indicate the first activity of the mind, but the second.

Education should not, therefore, begin with language, with the alphabet, and reading and writing, any more in the mother tongue than in a foreign language. It should begin with the systematic training of the sense activities that occupy the first six or seven years of life and alone are consciously exercised at this time; the growth of speech, though proceeding with marvellous rapidity, being a quite unconscious process. I have said elsewhere that a child who is taught words before he has learned to handle things is liable always to rank things in subordination to words, a dangerous and often fatal error. But in the handling and observation of things by a young child there soon comes the necessity for a pause. The necessity depends upon two circumstances; the material to be studied is difficult of access, and its important properties are too complex and too recondite to be made appreciable to the child's senses, consequently not at all to his mind. Because a simple sense perception is possible to a child at the time that a complex mental relation would be incomprehensible, it does not follow that a complex sense perception is more easily appreciated than a simple mental relation. Still less does it follow that it is possible to convey to a child knowledge of many of the most fundamental facts of science, which are not merely phenomena of nature, but complex ideas, composed partly, indeed, of observations of phenomena, but partly also of the inferences, often very subtle, which have been based on these observations.

It is a most ludicrous misconception of the nature of science to suppose that the little manuals and primers which abound for the purpose of disseminating information apart from scientific method, really teach anything at all. Again, it is a most dangerous prep-

aration for the study of science to call upon children to imagine or represent to themselves facts which have not been apprehended by their senses, or those which could never be. Why should we try to make a child believe that the earth goes round the sun, a statement which contradicts all the experience of his senses? I should rather tell a child, if interrogated, that I have heard that some people said so, but that I myself had no real knowledge on the subject; which is strictly true. Scientific imagination is only permissible to those whose minds have once become saturated with pictures of real things from prolonged contemplation of nature. The interposition of drawings, schemes, models, diagrams, and the like does not facilitate knowledge of nature, but tends rather to fatally defer the possibility of attaining this knowledge. Hence, until the real objects can be perceived, and by means of the real scientific methods, there is nothing gained, but only precious time wasted in pretending to study them. This same precious time can, however, be utilized in the study of a class of objects which are everywhere accessible in abundance, and whose properties can be rendered conspicuous and intelligible to a properly prepared child of seven or eight. This class of objects consists of words.

There can be no antagonism between the study of things and the study of words; but the first must initiate education, and the second take it up when further progress in the first has become too difficult. To the study of words, as I propose to show, may be brought the scientific methods used in the study of things—observation, analysis, comparison, classification; and the child may thus begin to be trained for

physical science at a time when the pursuit of most physical sciences is impossible.

The purely descriptive sciences of botany and map geography, already begun, may indeed be slowly pursued ; but the most strenuous study for the time should be that of language. This study does not merely serve to occupy the time and to acquire a kind of knowledge necessary for practical purposes at a time when such acquisition is most convenient. But it provides, even in its first stage—the study of words—a discipline that is quite indispensable to the pursuit even of physical science, whose alleged utility is so often contrasted with that of language.

The habit of handling abstractions, if not exactly essential to the simplest perceptions, is essential to all thought about these perceptions. It is essential also to all perceptions beyond the simplest and most obvious, for the larger part of what the mind perceives is what the mind brings to the object from its previous store of knowledge and reflection. Every word is a condensed generalization of experiences or of observations. Only those accustomed to words are successful in condensing into unity even their own observations ; still less, those of multitudes of other people.

The second part of language, grammar, affords still higher training in the mental processes involved in scientific study. Grammar is the science of relation between conceptions. It is the science of propositions, of the laws whereby words so group themselves in consciousness as to form distinct complex ideas. We have supposed that individual impressions depend upon the excitation of definite areas of brain tissue, and that verbal impressions were peculiar in resulting from the combined excitation of several such areas.

A proposition implies the coincident excitation of a much larger number of areas, and especially in the non-sensory concept centres. The physical basis of the relation of the parts of speech in a sentence to each other we must represent to ourselves to be the vibration of the fibres (the associating fibres of Meynert), which connect these several excited areas and bring them into material relation with each other.

The study of grammar, therefore, differs from the study of words in two ways. It calls into play more predominantly the concept centres as compared with the sensory centres; and it emphasizes the excitation of the connecting fibres of the brain rather than that of the ganglion cell areas which they connect. Grammar, which from a certain standpoint is justly considered to be a branch of logic, disciplines the brain in handling and grouping the impressions which have been registered on it. The discipline thus obtained prepares the mind to similarly group and handle all new impressions; prepares it, therefore, to find a discipline in the material of physical science, as it could not otherwise do. Without such previous training in language, the mind is almost inevitably staggered and confused by the immense mass of impressions it tries to grasp in either physical or moral science.

Literature, the third department of language, represents the action of mind upon nature in a manner co-equal with that shown in science. To enable adolescents to become acquainted with European literature, it is necessary that in childhood the preliminary work in the lower departments of language, words and grammar, shall have already been accomplished. In words and grammar are already found outlined or reflected the history and the philosophy

of European nations. Studied with the same system and method that would be applied to the material of a physical science, words and grammar will lead the child insensibly, but profoundly, into the very heart of literature, and into the central life of the races of humanity that concern him. Until he has touched upon this, his own is incomplete.

The foregoing considerations answer, we think, the second question, which asks a comparison between the educational values of language, mathematics, and physical science.

They also answer the third question, namely, when the study of language may be most profitably pursued. The characteristic time for this study is between the age of seven, as the kindergarten training closes, and the age of fourteen or fifteen, when really scientific studies may be begun.

III.

I have asserted a little while ago that the most characteristic benefits to be derived from the study of European languages are only obtainable if several of them are studied simultaneously, and on the same plan with which we should study the different members of a single botanical family.

The table below shows the division made by modern philologists of the great Indo-European family of languages. Out of these it is sufficient, both for practical and theoretical purposes, to select three branches, the Greek, Latin and Gothic branches. From the first two we need Latin, Greek, and French. From the third, English and High German. Knowledge of these five languages is requisite to the real understanding of any one of them ; and if these are possessed, knowledge of the remainder, though often most interesting, is

unessential and may be deferred or neglected. Thus as a modern representative of Latin, either French or Italian, perhaps even Spanish, might be selected; but on the whole, to-day, a practical acquaintance with French is most often required; and, as Milton observed, any one who knows Latin should be able in three weeks to learn Italian. It is hardly necessary to observe that these languages contain the literature and mirror the thought and life of Europe. Nor is it necessary to dwell on the vulgar error which would distinguish Latin and Greek as dead languages, and hence less useful than modern dialects which may possibly be spoken. To an English-speaking person of any culture, Latin and Greek are far more living than Spanish or Portuguese or Dutch, all spoken languages. Five-sevenths of our English vocabulary is Latin.¹ As Prof. Harris remarks, we are still living in the midst of Roman civilization. Yet Greek is so much nearer the complex flexibility of modern habits of thought, that Dr. Schliemann might almost be justified in urging its

INDO-EUROPEAN LANGUAGES.

ARYAN.	SOUTHWEST EUROPE.	NORTHERN EUROPE.	SCLAVONIC.
SANSKRIT.	GREEK. Modern Greek.	Bulgarian. Polish. Russian.	Bohemian. Lithuanian. Old Prussian.
IRANIAN.	LATIN. Italian. Spanish. Portuguese. French.		TEUTONIC. Gothic (extinct). Scandinavian. Danish. Swedish. Norwegian. Icelandic.
ZEND.			Germanic.
OLD PERSIAN.	KELTIC. Tribes in Spain. Gaul. Britain. Armenian.	Low German. Friesic, Dutch. Anglo-Saxon. Old Saxon. Ireland.	High German. English, comp. from { Anglo-Saxon. Latin.

¹ Whitney : Life and Growth of Language, p. 117.

acquisition before Latin, and as a spoken conversational tongue. It is, moreover, as is just beginning to be noticed, a really modern and still spoken language ; but this consideration is practically less important than the others adduced.

With which vocabulary from among these languages a child begins his systematic study of language, is almost a matter of indifference. Still, it is usually preferable to select Latin, because its letters are the same as English, as is not the case with German and Greek ; because the structure of its words and spelling is most closely allied to English, which is not so obviously the case with French, whose pronunciation also offers peculiar difficulties ; and finally, because the regularity and simplicity of its grammar render it the language in which the principles of grammar should first be studied. Greek grammar is more complex ; French and German, more arbitrary and capricious, especially French. English grammar is atrophied, and as unsuitable as a field wherein to learn the principles of grammar, as the hoof of a horse would be as a model for the study of feet.

It is desirable, when possible, that a child learn instinctively two languages from birth ; but it is also desirable that no attempt be made to teach it to speak more than two. Supposing these two languages to be English and German. At the age of six and a half or seven, a dozen lessons should suffice to initiate the child into reading the same, when he is only obliged to translate the new visual signs into auditory signs with which he is already familiar. The initiation once effected, it is quite unnecessary to pursue further special systematic instruction in reading and writing these two mother tongues ; knowledge of which will be picked up incidentally, and much faster than by the

usual methods. But the child may at once, at the age of seven, begin to read in Latin and French simultaneously. It is not customary to consider this possible, because the study of foreign languages is habitually initiated by the study of their grammar. But this is as unphilosophical as was the former practice of beginning the study of English with spelling and grammar.

Children tend to learn a foreign language by precisely the same process by which they acquire their own. They first learn words, and are so powerfully impressed by the roots of these, which convey all their essential meaning, that they remain perfectly indifferent to their collocation, termination, and inflection. If, disregarding this natural tendency, the teacher compels the child to study grammar first, an opportunity to learn a great deal is wasted, and much time is also wasted in learning a very little.

Part of the mistake depends upon the assumption that a child must be taught to speak the language before learning how to read it ; and for speaking correctly, a knowledge of grammar and idiom is indispensable. This is the view taken of the modern languages. But another mistake is made when Latin is considered ; for as a really fluent reading knowledge of Latin is to-day rarely aimed at, the advantage of its study is often supposed to lie exclusively in the discipline afforded by its grammar. Hence, with French, the child is tied down to endless uninteresting questions about the umbrella of my aunt and the inkstand of my grandmother, in the useless attempt to teach him to speak French correctly ; or in Latin is drilled upon the galloping of swift legates from the armed city, so that he shall be able to parse Caesar's Commentaries. Yet I imagine that even Roman children did not trouble themselves much about legates. And the con-

versational methods of modern French text-books, often admirably designed when the time has really come to teach grammar, will, when premature, only serve to suggest to the child, as I heard one say, "that the French must be an awfully inquisitive people to ask so many foolish questions."

The manipulation of a foreign language by speaking and writing it to express one's own ideas is a much greater cerebral effort than is generally recognized. It is an effort that is not demanded at the same stage of knowledge about any other subject. For instance, a student is expected to spend a very long time upon the study of descriptive botany before he would be called upon to invent botanical theorems of his own. Speaking a foreign language is the mental equivalent for thinking out original propositions in a foreign science. The difficulty is usually evaded by the student using some hybrid form of speech, as Roger Ascham long ago remarked was the case with young English children compelled to speak Latin,—or rather in a barbarous gibberish that rather deferred than facilitated their acquisition of the classic speech.

It is the study of words, which corresponds to the descriptive study of the details of a science, with which the mind must become saturated before it attempts to re-arrange their relations into new formulae. It is the study of words, therefore, which should come first—*not* the attempt to use them, except where the language has been learned instinctively in the nursery.

The words cannot certainly be learned in rows out of a dictionary, but only in connection with their context.

For Latin it is well to construct simple sentences containing only a subject, object, and verb in the third person, which sentences the child must be shown how to read, translate into English, and then write out a

translation into French. This can be done at the very moment the child is still learning how to read in English, and an immense amount of time thus be saved. A three-fold impression is made upon the mind ; the words in the three closely allied languages fuse readily into a complex conception, which retains its several parts much more firmly than when each is learned separately. At this epoch the mind is naturally quickened for the acquisition of verbal signs, and the acquisition of one facilitates that of the rest.

When any set of mutually convertible sentences has been written in the three or four languages, the words in them may be picked out and their roots compared with one another. At seven years old it is quite easy for a child to learn to understand the nature of roots. In his own use of language, as has been said, a child cares for nothing else. He is very much in the condition of his primitive Aryan ancestors. Remembering the fact that to a child anything may be made intelligible which is appreciable by his senses, it is clear that there should be no difficulty in pointing out to him the affinity of the sounds produced by the same organs of articulation. He can be easily taught to distinguish gutturals, dentals, and labials, or even the distinction of surds and sonants, and thus to learn the facts at the basis of Grimm's law.¹ In the table below is shown

¹ GRIMM'S LAW.						
ORIGINAL SOUND.	SANSKRIT.	GREEK.	LATIN.	GOTHIC AND LOW GERMAN.	HIGH GERMAN.	
Aspirates	kh	gh (h)	χ	h, f (g, v)	g	k
	th	dh (h)	θ	f (d, b)	d	t
	ph	bh (h)	φ	f (b)	b	p
Sonants	g	g (i)	γ	g	k	ch
	d	d	δ	d	t	zz
	b	b	β	b	p	f, ph
Surds	k	k	κ	c, q	h, g (f)	h, g, k
	t	t	τ	t	th, d	d
	p	p	π	p	f, v	f, v

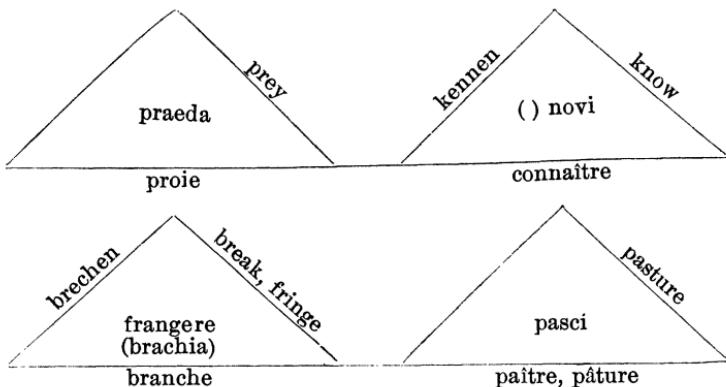
the method of analysing, for a child seven or eight years old, the Latin words *tectum*, *frango* and *calidus*, and their philological equivalents in French, German, and English.

¹ T	² E	³ C	⁵ T	⁶ UM	¹ Dental letters all correspond.		
¹ T	² O	⁴ I	⁵ T	⁶ ()	² Vowel " " "		
¹ D	² E	³ CK	⁴ ()	⁶ ()	³ Guttural " " " and duplicate.		
¹ D	² E	³ CK	⁴ ()	⁶ EN	⁴ Guttural broken down into i.		
					⁵ Dental letters correspond.		
					⁶ Terminations omitted for <i>toit</i> and <i>deck</i> .		
¹ F	² R	³ A	⁴ N	⁶ G	⁷ O		
¹ F	² R	³ I	⁴ N	⁶ G	⁷ E		
¹ B	² R	³ EA	⁴ ()	⁶ K	⁷ ()		
¹ F	² R	³ A	⁴ ()	⁶ G	⁷ I		
¹ B	² R	³ E	⁴ ()	⁶ CH	⁷ E		
					¹ Labial letters all correspond.		
					² Liquid " " "		
					³ Vowel " " " or duplicate.		
					⁴ Liquid " " " ; omitted for		
					<i>break, fragile</i> and <i>brechen</i> .		
					⁵ Guttural letters correspond.		
					⁶ Terminations omitted for <i>break</i> .		
¹ C	² A	³ L	⁴ I	⁵ D	⁶ U	⁷ S	¹ Gutturals correspond.
¹ CH	² A	³ U	⁴ ()	⁵ D	⁶ ()		² Vowels correspond.
¹ H	² EA	³ ()	⁴ ()	⁵ T	⁶ ()		³ Liquid broken down into u, or omitted.
¹ H	² EI	³ ()	⁴ ()	⁵ SS	⁶ ()		⁴ Vowel omitted in others.
							⁵ Dentals correspond.
							⁶ Termination omitted for <i>chaud, heat</i> and <i>heiss</i> .

Thence the step is easy to the recognition of the equivalent letters in the corresponding words of different European languages. Practically, he thus learns half a dozen words in the time usually occupied in learning one; learns them with six time the vividness, and is six times less likely to forget them. Philosophically is laid the basis for the conception of central unities diversified by superficial differences, which is one of the fundamental conceptions of both philosophy and science.

In the *Teacher* for June, 1888, I have described a little device for the comparison of verbal roots, which I have called "language triangles." The child draws one side of a triangle; in the centre of this he writes the Latin word. Under the base line, and thus parallel to the Latin, he writes the French word, when it really

has the same root ; and on the two other sides, opposing each other, he writes the German and English. The words so taken must always have the same root. If in either of the four languages the object or idea is expressed by a different root, the space for that language is left blank on the triangle.¹ In addition to those published in the *Teacher*, I subjoin some others.



At a later period of study, and when enough grammar has been acquired to render possible the correct construction of sentences, the comparative study of words may be pursued in a somewhat different fashion. A Latin word may be selected from a sentence in which it has been read, and introduced into a new sentence, to be devised by the child. Then sentences in English, French and German, later in Greek, must be similarly devised so as to introduce the cognate meanings of the same root, with their expressive shades of difference. The system simply extends the method, already in current use, for studying English synonyms. A few examples may serve to illustrate the advantage of this device.

¹ See *Teacher* for June, 1888. New York.

Multas virorum clarorum statuas in templo *posuit* dux.

Je sais *positivement* qu'il va pleuvoir.

We *postponed* going to the picnic.

Oppidum obsessum *victus* satis habuit.

There was an old woman, and what do you think,
She lived upon nothing but *victuals* and drink.

Puella regi se *tradidit*.

The boys *traded* marbles with the girls.

Le *traître* a *trahi* le roi.

By such methods, the child, at the end of a year, may be expected to learn from three hundred to five hundred Latin words, and their cognates in French, English, and German. It is not to be presumed that these will be learned beyond the possibility of forgetfulness ; but at least the first impression of them will have been made upon the brain. At the same time a beginning can have been made in reading French, whose resemblance of construction (though not of verbal structure) to English makes it easier to read than Latin. A book interesting to the child must be selected, and the reading conducted exactly as it would be in English : the words spelled by the sound of the syllables, the meaning of each word told, and thus the phrase slowly interpreted. When the interpretation is once complete, the child must read the phrase over and over again, until it can be both understood and enunciated fluently ; for until the fluency is attained—and it always can be by sufficient repetition—the phrase does not represent language to the child. The attainment of fluency in the reproduction of the impressions made by the written phrase is not only important in itself, but it serves as a type of complete knowledge in any subject. Any kind of knowledge is only thoroughly grasped and digested

when all parts of the brain tissue impressed by it vibrate easily and harmoniously upon its suggestion. In reading words, so long as there is stumbling in enunciation, the knowledge has not risen to the rank of an acquired language, the isolated words have not fused into expressive speech.

It is to facilitate fluency, that for at least two years the teacher must supply the place of the dictionary, and tell the child the meaning of each new word. At most, when a word once learned has been forgotten, he may be led to refer to the previous phrase, and to recall the meaning from the context. It is indeed always desirable that the meaning of new words be divined as much as possible from the context. It is wrong to condemn this as reprehensible "guessing" and fatal to accuracy and thoroughness. The act implies an effort of the mind to revive faint reminiscences and to detect faint associations of ideas; it is the very act involved in scientific research after new truths. The teacher must of course be on hand to test the accuracy of the guess, and correct it if wrong or flippant.

The child should not at this period be left to himself at all. Argument as to what is intellectually possible for a child, must not assume that he is to be thrown upon his own resources to interpret the French or Latin page. Such independent work comes later. But the business at first is *not* to train the mind in self-reliance, but to saturate the brain with impressions, and to habituate the ear to a new form of speech. This must be done under guidance, as clay is moulded by the guidance of the sculptor's hand.

With such guidance, Latin—its construction somewhat modified—may be read with but little more diffi-

culty than the French or German. It is essential that the child become accustomed from the beginning to at least the easier peculiarities of Latin construction. It is pitiful to see scholars, after many months, even two or three years of study, still stumbling over Latin sentences, in the attempt to read them in the English order, to turn them, as it is said, "into good English." Now in order to penetrate fully into the spirit of a language, it is necessary at the moment of enunciating it, to banish all recollection of any other language from the mind. It must *not* be translated, or the habit of translation must cease as soon as possible. Then only is it evident that the mind places its different groups of verbal signs on the same footing. One great value to be derived from a fluent acquaintance with Latin and Greek is, that in passing into the unfamiliar construction, the mind passes into a separate consciousness ; and by so much enlarges the range of its own experience. This cannot be done to the same extent by means of French, German, or Italian language, because their construction too closely resembles our own.

After two years' study of words, and when by repeated practice, some empirical reading knowledge of French and Latin has been obtained, the child may enter upon the second part of language, the study of *grammar*.

The fundamental peculiarity of grammar has been pointed out. It is concerned with the relations of words and ideas, quite separated from their sensory origins ; concerned with processes that take place exclusively in the concept centres of the brain. These are called into function to a much greater extent than is the case even in regard to words, which indeed transcend

sense impressions, but not to the extent to which the conception of verbal relations does.

It is perfectly absurd to make a child study grammar until its mind has been well stored with impressions of words. And, on the other hand, it is equally absurd, and a great waste both of time and of fitting opportunity, to defer the study of words until the mind has become ripe for the study of grammar.

Why French grammar should ever be learned before Latin, I have never been able to understand, yet I know it is often done. A large part of its subject matter consists of idioms and conventions, whose reason lies in the historical development of the language, and not in logic. Now a child is capable of logic, long before it is really capable of history. To teach French grammar before Latin, is to accustom the child to place accident before necessity, and convention before truth ; a most fatal habit of mind. The two grammars should be studied simultaneously.

In considering grammatical inflections, the child learns to develop an idea whose germ had been previously acquired, namely, that the essence of the word lies in its root, and that the termination is a varying modality. But to fully appreciate this fact, the child must be led to discover the inflections and their groupings for himself, and not confronted at the outset with lists of declensions and conjugations to be learned by heart. This universal practice is, from a psychological point of view, simply barbarous. By a scientific method the child should be led to deduce the inflections from his own observations of the facts of the text. Reading the same word in many different connections, and being obliged, by the context, to translate it differently each time, the child can be led to notice

the different termination which corresponds to each translation. From these various observations he can gradually build up for himself, of course under guidance, a complete scheme of the five declensions. Much more time is thus consumed than in the ordinary method of learning these declensions by heart. But, on the other hand, the child repeats the process by which the grammar was originally constructed, and what is still more important, he becomes acquainted with the method which is typical for all scientific study ; he collates scattered facts, brings them together, observes their relations, and establishes their law.

The same method applies to the more difficult study of the verb. But here three degrees of generalization are to be observed, that of person, of tense, and of mood. The first distinction is the most general and the most easily appreciated. The extreme regularity of the person terminations in the Latin verb makes them an easy subject for drill. After they have been discovered and established, the distinctions of tense may be similarly dealt with ; first, in their broad distinctions of past, present, or future time ; later, in the subdivisions of past and future time, that for a long time must seem to the child unnecessarily subtle. Even more subtle are the modifications of assertion implied in moods. I do not think the distinction of indicative, subjunctive, and infinitive mood can really be made intelligible to a child under eleven or twelve years of age, if it can then. But, nevertheless, these moods can be studied descriptively at eight or nine, when they are not explained, but merely characterized by the English auxiliary words used with them, *may*, *might*, *to*, etc.

The inflections of nouns and verbs furnish the child

with conceptions of scientific classification at a time when, as already pointed out, these cannot be obtained from physical science. They furnish types of more abstract classification than is afforded by study of word roots, for inflections represent modifications of roots corresponding to modifications of the mind perceiving them. The mind does more than perceive—it handles these roots ; it freely manipulates for its own purposes what has hitherto been presented to the child in a purely objective aspect. When a child learns a language on its subjective side first—learns by habit to speak it and use it as a tool, he loses the immense impression obtainable when words have first been studied objectively, as classes of things having a real and independent existence ; and the mind is afterwards seen to establish a free dominion over these same things, moulding them to its own purposes, yet leaving their essential nature undisturbed. Here is a splendid type of the action of the human mind in nature, whose details once conquered, may also be inflected to express human meanings.

When the inflections have once been learned, the child must change his mode of reading. He must no longer be told the meaning of words, nor allowed to divine either the root meaning or the mode from the context, but he must infer the precise interpretation of each word and of the entire sentence from these inflected terminations.

It is generally recognized that this act of inference or reasoning is an important mental exercise. Indeed, teachers are rather liable to err on the side of thinking that this is the only kind of mental discipline, and that it is, moreover, the chief value of learning Latin. Neither assertion is true, but the value of the infer-

ence is nevertheless great. In it the fact observed, as for instance the termination of the genitive case, is first associated with previous impressions of other similar terminations and the similarity recognized. Then associated circumstances of these previous impressions are revived in memory, as the fact that the termination belongs to such a declension, and is translated by the word "of" in English. The association of these circumstances is transferred to the new impression which has been placed in the same class, and the word therefore interpreted as the others had been.

Acts of inference always imply a similar revival of past impressions, principal and accessory, and their fusion with the impression newly received. They powerfully exercise the mind because they fuse scattered excitations or vibrations into energetic unity. The inferences demanded of the child in translating Latin are simply the type of mental acts that are to be demanded of him all his life, and constitute an excellent preparation for these. The logical value of French and German is so much less, because precise knowledge of construction and inflection is unnecessary to the interpretation, and the general similarity to English renders much narrower the space traversed by the mind to reach the point of view of the foreign consciousness.

All grammatical subjects must be studied on the principles laid down for study of the inflections. The laws, as far as possible, must be deduced from observation of the facts, and not announced categorically, with the facts adduced in illustration. Grammar must be carefully kept subordinate to language considered as a means of expression and communication.

I often think that the feeling for Latin literature is

as much injured by excessive drill in parsing, as the literary appreciation of Milton was impaired by the old-fashioned drill in *Paradise Lost*. The study of grammar as a complete and highly abstract science properly belongs only to ripe minds—at earliest, to the period of adolescence.

For children under fifteen, only just so much grammar should be required as is essential to the accurate interpretation of what is read, and to the power of approximate accuracy in writing.

For young children, the selection of grammatical subjects in the order of their real comprehensibility to the growing mind is a delicate, but most interesting task. Two principles should guide the selection. First, that ideas are easy for the child in the degree to which they approach or involve sense perceptions or concrete conceptions, and are difficult according as they recede from these and become generalized. And second, that grammatical laws and rules are impressive in proportion as they seem necessary ; and unimpressive, therefore difficult to remember, according as they relate to what seems unimportant, that is, to whatever is unessential to the interpretation of the sentence. Hence the parts of speech which modify the noun and verb are much more difficult to learn about than the noun and verb themselves ; and it is illogical to place the study of the adjectives, and especially the study of their comparisons, before the study of the verb. Similarly for adverbs, conjunctions and prepositions, and for all devices for linking words together, and for which the child does not feel the necessity. Similarly for the relations of the parts of a sentence to each other, the discussion of subject and object, the management of the infinitive mood in its relations to the

moods of other verbs and to the accusative case ; similarly with a host of other subjects that will readily suggest themselves to an experienced teacher, if examined by the test of the principles above stated. A child can become cognizant of a great many grammatical facts at an epoch when it would only be bewildered by the abstract law of these facts. It is easy to learn the fact that if a person or thing is said to be doing anything, the name of this person is put in the nominative case ; and this may be intelligible in Latin, when it is quite unintelligible in English. But, at the very same time, the child may be utterly bewildered by the statement, "The subject of the verb is in the nominative case."

Again, it is easy to explain the relations of the subject to an active verb, when it is still very difficult to explain the passive verb or voice. I have noticed that children have the strongest tendency to put the subject of the passive voice in the accusative, because they declare (and with logic) that "something is being *done to the person.*" And I think it is hopeless to demonstrate that the terrible verb "to be" is a verb at all. The fact can only be learned empirically, and all explanation of it sedulously avoided. The child confounds this verb with an adjective, and in doing so, merely reverts instinctively to the fundamental conception of the predicate, out of which the verb and adjective have diversely sprung. On the other hand, the picturesque expression of "strong verbs," applied to the famous eleven irregular verbs in Latin, can be easily appreciated by the child, as indicating words worn into irregularities by constant use.

In all study of grammar under the age of twelve this rule should dominate : let nothing be learned but

what is essential to the interpretation and manipulation of the language, and defer philosophical grammar to a ripe stage of mental development. The energy often wasted upon premature study of grammar is much more profitably occupied in acquiring fluency in language.

The slow, deliberate, and thorough accumulation and manipulation of verbal impressions enriches the brain. But it is the rapid and instinctive manipulation of such impressions that renders the mind agile and flexible, because it accustoms the brain to the rapid and multiple propagation of excitations, and their varied combinations into secondary excitations.

So far nothing has been said about learning Greek. I think that this should be begun gradually, between the ages of ten and twelve, at first merely by learning proper names and the words cognate to the Latin roots, as these are successively studied. By the age of twelve, a sufficient fluency in the capacity of reading and writing French should have been acquired to justify dropping its study for a while, and substituting the systematic study of Greek, this to be pursued most strenuously during the next four years.

The general construction of a language exhibits on a still larger scale than does its elementary grammar, a process of cerebral synthesis in which the "association" fibres of the brain are involved, those namely which connect separate convolutions with each other. Every special form of language construction depends upon a special grouping, not merely of different areas of cells, but of different convolutions, of distinct territories often widely separated. We may compare these different regions to groups of battery cells, standing on different tables in a laboratory, and labelled A, B, C, D,

etc. These groups may be brought into a circuit in various ways according to the order of their connection with one another. Thus we may have,

$$\begin{aligned} & A + B + C + D, \text{ or} \\ & A + C + B + D, \text{ or} \\ & A + D + C + B, \text{ or} \\ & B + C + D + A, \text{ etc.}, \end{aligned}$$

the variety depending on the laws of permutation.

The different permutations correspond to the different modes in which separate brain regions may be brought into connection with each other, in the general synthesis of cerebral activity that effects the expression of speech according to the construction of a special language.

When a person, habituated to one form of construction, learns to understand fluently, to think, and still more to speak under another form, the functional grouping of these brain regions must be changed. Though the anatomical architecture of the brain remain the same, its functional relationships are rendered different. This change, like all changes for nervous tissues, constitutes an immense stimulus and excitation, proportioned to the extent of the change. To consciousness, the mind seems to have traversed a certain space to place itself at the new point of view. The physical basis of this consciousness is the space occupied by the nerve fibres of the brain, which propagate vibrations from one convolution to another. When an English-speaking person projects his consciousness into the form of language construction peculiar either to Latin or Greek, he seems to traverse a much wider space than if he simply pass from English to French, or even to German. The re-arrangement of direction for the intra-cerebral propagation of vibrations or excita-

tions, must therefore be much more extensive for the ancient languages than for the modern. Hence the mental development, or cerebral stimulus derived, must be much greater.

The special values of the study of Latin over the modern languages may now, in answer to our question, be categorically stated.

1. No European language, and no European history or philosophy, apart perhaps from the Sclavonic and Scandinavian groups, can be understood without knowledge of Latin.

2. Least of all can English language, philosophy, or history be understood, since the language is simply a combination of Anglo-Saxon and Latin, in which Latin considerably predominates, and Rome is indelibly impressed upon English history, thought, and institutions.

3. In the study of words, which should initiate the child into the study of language, the Latin roots are best fitted for beginning, on account of their familiarity, conspicuousness, simplicity, and ready manipulation.

4. The Latin grammar is the most perfect grammar of Europe, and should alone be used to teach grammatical principles, selected in the order of their natural comprehensibility for the developing mind.

5. The construction of the Latin language as a whole compels the translation of the modern mind into a form of consciousness sufficiently remote from its own to necessitate a great change in the general synthesis of cerebral activity. The same is true of Greek. The change constitutes a powerful mental exercise and brain stimulant.

To obtain the full value of the study of Latin and Greek upon the development of the brain, must be

applied the principles that are now generally, though half consciously, invoked in the acquisition of the mother tongue and of modern languages, namely, the synthetical impressions of the language as a whole must be copiously stamped on the brain before the pupil is called upon to analyze the language.

This is to be done by means of *much* and *rapid* reading. Roger Ascham tells us that Queen Elizabeth became a good Greek scholar by every year reading entirely through the works of Demosthenes and of Isocrates. The reading must be on a subject interesting to the child ; hence it is scarcely possible that it be directed to classical authors usually chosen for a school curriculum. It is the fashion among some teachers to denounce "readers of manufactured Latin," and declare "that the sooner a boy can draw his Latin from the living spring of a classic author, the better."¹ This principle may or not be correct from the point of view of the Latin scholar, but from the standpoint of the physiologist and psychologist it is certainly absurd. We do not forbid English children to read English until they are capable of understanding Milton ; or French children from reading French so long as they fail to understand Jomini's Art of War. It seems improbable that Roman children were ever schooled upon Caesar's Commentaries. It would be a poor commentary upon the results of the Latin scholarship of so many centuries, to assert that there are now no scholars capable of writing Latin in a way that should gradually initiate young children into the difficulties of its construction, while accustoming them to look upon Latin as upon any other languages,

¹ Six Weeks' Preparation for Reading Caesar. Note to teachers on first page.

as a medium for communicating interesting ideas, and not merely as gymnastic exercise for the intellect, concerned with ideas to which the child must be indifferent.

An immense number of Latin idoms can become familiar to a child in the same way as French idioms do, by the process of repeated observation of them in the course of reading, and this at a time when the abstract, the scientific statement, or law of those idioms could not really be grasped. Familiarity with the fact should logically precede analysis of the fact. Reversing this process, as is usually done, may make grammarians ; but, unless the study is prolonged many more years than is usually practicable, it does not enable the student to read the language. It is very rare to find that a boy or girl who has begun to study Latin at twelve can read Latin fluently at sixteen, though far more time is given to the study in these four years than should be the case, for they are too precious and too much needed for other things. If during the four years preceding twelve, familiarity with the phenomena of Latin had been acquired by frequent repetition, the subsequent scientific analysis of these phenomena, *i. e.* the grammatical study of the language, would be ten times as fruitful of result.

The development of our subject has insensibly furnished the answer to another of the questions started at the beginning of this essay. It is necessary to maintain a just proportion between the study of languages and the other studies of a general curriculum. The effect on mental development and training is to be obtained, if at all, by the age of fourteen, fifteen or sixteen. By this time the pupil requires the broader

and more robust discipline of other knowledge, pursued with the thoroughness of scientific method which will then be practicable. It is undesirable to continue the systematic study of languages at this time ; they should be dropped altogether, although the habit of reading in all may be most profitably kept up, and other subjects, especially history, studied through their medium.

All that has been here said on the physiological value of the study of language applies to the developing mind—to the stage of development at which signs are being coupled with things, and the “mental couple” raised to the concept centre, and accepted as a unity in consciousness. For the adult mind, accustomed to the use of signs, the acquisition of a foreign language can have no such educational significance. It is true that an adult who has had no training in language, finds such difficulty in undertaking the study of anything else, that he is best advised to acquire a language, especially some knowledge of Latin, before attempting any other study, especially that of medicine. But he cannot derive the same relative benefit from learning the language then as if he had learned it as a child. Moreover, in learning the language, the time is relatively wasted that might be more appropriately spent in learning to grasp larger and more complex groups of facts and ideas than are presented in any but the really philological study of language.

Hence, one great reason for teaching children a reading acquaintance with four or five languages between the ages of eight and fourteen, is that by the latter age they may really know these languages, and then begin to study something else more difficult, or of more immediate practical utility.

Nevertheless, some study of language must always accompany all other studies. Language which alone perfectly expresses all internal thought, also mirrors all external things as they have ever impressed the mind of man. Language, speech, is thus truly the Logos, the intermediary between the soul and the world. It is at once the thought made flesh and flesh sublimated into thought.

But advanced philological study should be regarded as distinctly a specialty, as is the advanced study of philosophy, or of chemistry, or physics, or physiology, or any other science. That a youth must have, or pretend to have, a perfect knowledge of Latin and Greek before he attempt to acquire even a smattering acquaintance with the world around him, is certainly a traditional superstition. But by the method of language study which has been here advocated, the student may really experience the discipline conferred by language training, may enjoy the immense practical advantage of admission to all European literatures, and yet secure time for a comparatively liberal education in other directions, equally important.